VIBRIOSIS
(Including Cholera)

✓DISEASE AND EPIDEMIOLOGY

Clinical Description:

Cholera: Cholera is an acute bacterial enteric disease characterized by a sudden onset of watery diarrhea, nausea, and acute vomiting. Some cases are asymptomatic or mild, but about 5% of individuals will develop severe illness that can result in rapid death if untreated.

Parahaemolyticus: Parahaemolyticus is an acute bacterial enteric disease with watery diarrhea and abdominal cramps, usually with nausea, vomiting, fever, and headache. This disease is moderately severe and can last from 1-7 days.

Vulnificus: Vulnificus can present in a severe invasive form (septicemia combined with shock and often disseminated intravascular coagulation – DIC) or in a mild to severe cause of wound infections.

Causative Agent:

Vibrio is a genus of bacteria (gram negative rods) that can produce a variety of toxins.

Cholera: Vibrio cholera serogroup O1 and O139 are associated with pandemics of diarrhea. Those organisms in serogroup O1 are further differentiated into biotypes, known as Classical and El Tor. Each biotype can be further classified into 3 serotypes: Inaba, Ogawa, and Hikojima. Vibrio cholera not serogroup O1 or O139 can be less severe and are not known to produce pandemics, but rather sporadic illness.

Parahaemolyticus and vulnificus: These are species of Vibrio that are highly salt-tolerant.

Differential Diagnosis:

Cholera: This is a relatively characteristic clinical picture, but mild cases may resemble Shigella.

Parahaemolyticus: Infection with this organism is often misdiagnosed as appendicitis due to the extreme abdominal cramping.

Vulnificus: Vulnificus septicemia can have a similar presentation to toxic shock or hemolytic uremic syndrome (HUS). Infected wounds should be differentiated from Group A strep or clostridial myonecrosis.

Laboratory identification:

Most clinical and reference laboratories can identify Vibrio species, however clinicians should indicate on the test request form that Vibrio species are suspected, as these organisms may not be identifiable on typical laboratory media. Vibriosis can be identified via culture or via acute and convalescent serologies.

UPHL: The Utah Public Health Laboratory can provide confirmatory testing to clinical laboratories, which involves speciation and typing Vibrio cholera into serogroups and O1 serogroup into serotypes.

Treatment:

The cornerstone of treatment is timely and adequate rehydration. If patient is mildly to moderately dehydrated, oral rehydration will be adequate. If severely dehydrated, then rehydration should occur through the intravenous route to repair fluid and electrolyte loss. Also, severe cases should be given antibiotic therapy to shorten the duration of diarrhea, reduce the volume of rehydration solutions required, and shorten the duration of vibrio excretion. Doxycycline, tetracycline, ciprofloxacin, erythromycin, and furazolidone are all effective against vibrios.

Case fatality:

Severe cholera: Untreated can reach 50%
Parahaemolyticus: Rare.
Vulnificus: Patients with primary septicemia, fatality is over 50%.

Reservoir:

Humans are the primary reservoir, including asymptomatic carriers, but environmental reservoirs exist in brackish water and estuaries. Parahaemolyticus and vulnificus both live in coastal seawaters, fish, and shellfish.

Transmission:

Cholera and Parahaemolyticus: Cholera is transmitted via ingestion of food or water that has been contaminated with feces or vomitus of infected persons.
Vulnificus: Vulnificus is a free-living organism that is found in seawater

Susceptibility:

For cholerae, persons with low stomach acidity are at highest risk.
For vulnificus, persons with cirrhosis, hemochromatosis, or other chronic liver diseases, and immunocompromised hosts are at increased risk from the septicemic form of the disease.

Incubation period:

Cholera: The incubation period ranges from several hours to 5 days; it is typically 2-3 days
Parahaemolyticus: Ranges from 4-30 hours, typically 12-24 hours.
Vulnificus: Usually 12-72 hours.

Period of communicability:

Although direct person-to-person spread has not been demonstrated, cholera may presumably be transmitted as long as stools test positive for the bacteria, most likely until a few days after recovery from symptoms. Shedding of bacteria may occasionally persist for several months and rarely may persist for years. Antibiotics effective against the infecting strain shorten the period of communicability.
Neither vulnificus nor parahaemolyticus are considered to be infections that are transmitted from person to person.

Epidemiology:

Cholera: Pandemic cholera has been known since the early 19th century. While this is a significant cause of disease in some parts of the world, in Utah and the U.S., most cases will occur among travelers returning from areas experiencing cholera. Some cases have occurred from eating undercooked shellfish harvested from Texas or Louisiana coastal waters. People who have low stomach acidity (usually from antacid use) are at increased risk of cholera. Prior infection appears to provide some protection against strains within a serogroup.

Parahaemolyticus: This is typically seen as sporadic cases, but foodborne outbreaks have been seen from raw or undercooked seafood. This occurs primarily during the summer months.

Vulnificus: Illness due to this organism occurs most frequently in coastal states, as exposure to seawater through accidents or occupational wounds is most likely in these areas. In addition, persons who are immunocompromised or have chronic liver disease can acquire this disease via raw or undercooked seafood.

✓PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
    - Cases without appropriate travel history will require additional investigation.
    - Cholera is a Category B bioterrorism agent.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention
- Identify clusters or outbreaks of this disease and determine the source.
- Identify cases and sources to prevent further transmission.

Prevention:

Personal Prevention:

- Do not eat raw or undercooked fish or shellfish. Even shellfish harvested from U.S. coastal waters have periodically been contaminated with *V. cholerae.*
- Always wash hands thoroughly with soap and water before eating or preparing food, and after using the toilet.
- Wash children's hands as well as your own hands after changing diapers and of diapers in a closed-lid garbage can.
- Wash hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15-20 seconds after cleaning the bathroom, after using the toilet or helping someone to use the toilet, after changing diapers, before handling food, and before eating.

There is very little risk of acquiring cholera in the U.S. and travelers going to endemic areas should avoid risky foods and beverages that could transmit cholera and other diarrheal illnesses. Travelers should:

- "Boil it, cook it, peel it, or forget it"

- Drink only bottled or boiled water, however bottled carbonated water is safer than bottled non-carbonated water.
- Ask for drinks without ice, unless the ice is made from bottled or boiled water.
- Avoid popsicles and flavored ices.
- Eat foods that have been thoroughly cooked and are still hot and steaming.
- Peel raw fruits or vegetables and do not eat the peelings.
- Avoid foods and beverages from street vendors.
- Avoid undercooked or raw fish or shellfish, including ceviche or other shellfish "cooked" in citrus juices.
- Do not bring perishable food back to the U.S.

Chemoprophylaxis:

Chemoprophylaxis is usually not required in the U.S. If the case had significant breaches in hygiene such that there is evidence/high-likelihood that household transmission is likely, then contacts can be chemoprophylaxed.

Adults: Doxycycline – single dose of 300 mg (unless strain is resistant)
Children: Tetracycline (50 mg/kg/day in 4 divided doses for 3 days) or doxycycline as a single dose of 6 mg/kg. There is no risk of staining teeth in a short course such as this.

Vaccine:

- An available injectable vaccine is based on killed whole cells. It provides partial protections (roughly 50% efficacy) for a short duration (3-6 months). The vaccine does not prevent asymptomatic infection and adverse events are known.
- Oral vaccines are safer and provide better protection. One vaccine is a single-dose live vaccine, and the other vaccine is a killed vaccine requiring two doses. These oral vaccines are not licenses/available in the U.S.
- At this time, neither the WHO nor the CDC recommends cholera vaccination for most travelers.

Isolation and quarantine requirements:

Isolation: Food handlers with cholera must be excluded from work until diarrhea has resolved.

NOTE: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider.

Hospital: Body substance precautions. If patients have diarrhea, gloves should be worn for contact with the patient and the immediate patient environment.

Quarantine: Contacts with diarrhea who are food handling employees should be considered the same as a case and should be handled in the same fashion.

NOTE: In certain circumstances, cases, ill contacts, and/or asymptomatic contacts who are food handlers may be required to have negative stool samples prior to returning to work. The local health department will decide which cases and/or contacts will need negative stool samples prior to returning to work and whether 1 or 2 negative samples is necessary. If a case or contact has been treated with an antimicrobial agent, the stool specimen should not be collected until at least 48 hours after cessation of therapy. If 2

negative stool samples are determined to be necessary they should be taken at least 24 hours apart.

✓CASE INVESTIGATION

Reporting:

- **Cholera is an immediately reportable disease in Utah.**
- Isolation of any Vibrio species from any site, such as stool, blood, wounds, etc.
- Serological evidence of recent infection.
- Cholera is one of 3 diseases that require notification under the International Health Regulations. Therefore timely notification and investigation are essential so that UPHL can notify the Centers for Disease Control.

Case definition:

Cholera (1996)

Clinical description

An illness characterized by diarrhea and/or vomiting; severity is variable.

Laboratory criteria for diagnosis

- Isolation of toxigenic (i.e., cholera toxin-producing) *Vibrio cholerae* O1 or O139 from stool or vomitus, or
- Serologic evidence of recent infection.

Case classification

Confirmed: a clinically compatible illness that is laboratory confirmed.

Non-Cholera Vibriosis (2007)

Clinical description

An infection of variable severity characterized by diarrhea and vomiting, primary septicemia, or wound infections. Asymptomatic infections may occur, and the organism may cause extraintestinal infections.

Laboratory criteria for diagnosis

Isolation of *Vibrio spp.* other than toxigenic *Vibrio cholerae* O1 or O139 from a clinical specimen.*

Case classification

Confirmed: A case that meets the laboratory criteria for diagnosis. Note that species identification and, if applicable, serotype designation (i.e., *Vibrio cholerae* non-O1/non-O139) should be reported.
Probable: A clinically-compatible symptomatic case that is epidemiologically linked to a confirmed case.

Comment

In addition to reporting through the National Notifiable Diseases Surveillance System (NNDSS), CDC requests that states collect information on the standard surveillance form for Cholera and Other *Vibrio* Illness Surveillance System (COVISS), available at: http://www.cdc.gov/foodborneoutbreaks/documents/cholera_vibrio_report.pdf. CDC intends to integrate the COVISS form into the National Electronic Diseases Surveillance System (NEDSS) in the future.

Reporting sites should use the COVISS reporting form until the integration is complete and COVISS data can be transmitted to CDC. CDC requests that *Vibrio cholerae* and *Vibrio parahaemolyticus* isolates be referred to the Foodborne and Diarrheal Diseases Laboratory for characterization.

*Infections due to toxigenic *Vibrio cholerae* O1 or O139 are reportable as cholera (see current cholera case definition listed below).

Case Investigation Process:

- Assure appropriate laboratory testing.
- Food handlers should be excluded from work until diarrhea has resolved. Negative stool specimens may also be required.
- For cholera or vulnificus, it is especially important to obtain a comprehensive travel history for the duration of the incubation period, as these would be unusual diseases to acquire in Utah.

Outbreaks:

An outbreak will be defined as any case of *V. cholera* O1 or O139 without a travel history, or any two cases (non-household) cases of similar Vibrio species within a 30 day period. If an outbreak is identified, further investigation should occur to determine the source of infection and the mode of transmission.

Identification of case contacts:

If the patient has cholera that was identified as serotype O1 or O139, then all persons who shared food or water with the case during the infectious period would be case contacts. The case should be carefully questioned about hygiene practices, especially hand hygiene. If hand hygiene is poor, then household contacts should be considered case contacts as well.

Case contact management:

All identified contacts should be observed for five days from the last date of exposure for signs of illness. Preventive antibiotic therapy is usually not recommended for household contacts in the U.S. since secondary spread is rare.

✓REFERENCES

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